

# EFFECT OF PLUCK SET REMOVAL TECHNIQUES DURING SLAUGHTER ON PIG CARCASS CONTAMINATION WITH HYGIENE INDICATOR BACTERIA, ESBL/AMPC-PRODUCING *E. COLI*, *SALMONELLA* AND *YERSINIA ENTEROCOLITICA*

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## Introduction

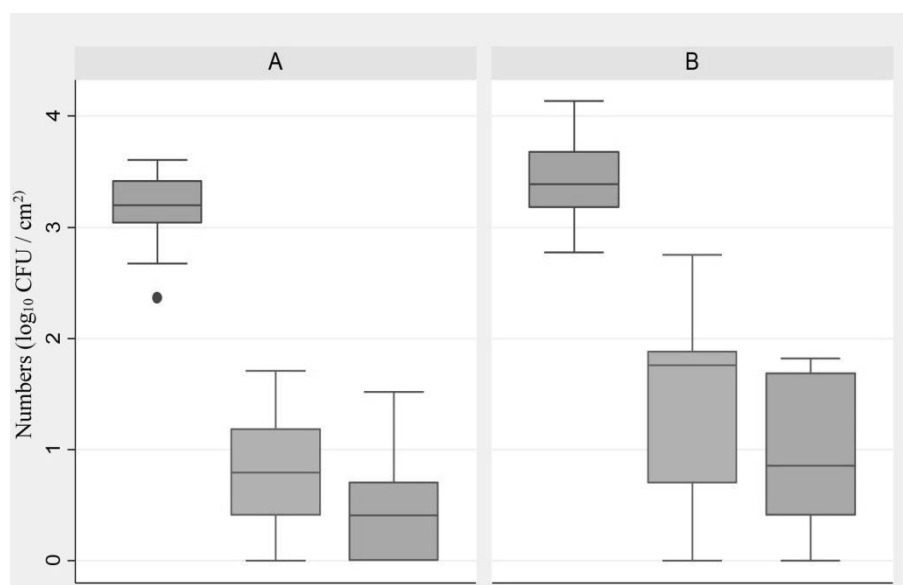
Pigs are asymptomatic carriers of pathogenic and antibiotic resistant bacteria, which may contaminate pig carcasses during slaughter [1]. Especially opening the oral cavity during pluck set (i.e. lungs, heart, liver, and tongue) removal is a potential risk for spreading bacteria over the carcass [2, 3].

## Purpose

The aim of this research was to compare carcass contamination between pigs of which the pluck set was removed following standard procedures and pigs of which the pluck set was alternatively removed (leaving tongue and highly contaminated tonsils inside the unopened oral cavity).

## Methods

From each of 12 pig batches, 20 carcasses (ten slaughtered normally and ten slaughtered alternatively) were sampled after pluck set removal by swabbing the elbow, throat and sternum (100 cm<sup>2</sup> each) in two Belgian slaughterhouses. Samples were analyzed to quantify total aerobic bacteria, *Enterobacteriaceae* and *E. coli* by direct plating on Plate Count Agar, Violet Red Bile Glucose agar and Tryptone Bile agar with X-Glucuronide, respectively. The presence of ESBL/AmpC-producing *E. coli* was investigated by plating on Tryptone Bile agar with X-Glucuronide supplemented with cefotaxime. Further, qualitative analysis was performed for *Salmonella* using pre-enrichment in Buffered Peptone Water, enrichment on Modified Semi-solid Rappaport Vassiliadis and plating on Xylose Lysine Deoxycholate agar. *Yersinia enterocolitica* was isolated after enrichment on Phosphate Buffered Saline medium, KOH treatment and plating on Cefsulodin Irgasan Novobiocin agar.



**Figure 1.** Quantitative analysis of hygiene indicator bacteria on the sternum.

Comparison between 10 alternatively slaughtered pigs (A) and 10 pigs slaughtered according to standard procedures (B), all originating from the same batch. Total aerobic count = blue ; *Enterobacteriaceae* = red; *E. coli* = green.

## Results

Average total aerobic counts for throat samples ranged between batches from 2.1 to 3.8 log<sub>10</sub> CFU/cm<sup>2</sup> with mean reductions up to 0.6 log<sub>10</sub> CFU/cm<sup>2</sup> when using the alternative method. Median throat *Enterobacteriaceae* and *E. coli* numbers varied between batches from 0.6 to 2.8 log<sub>10</sub> CFU/cm<sup>2</sup> and 0.4 to 2.3 log<sub>10</sub> CFU/cm<sup>2</sup>, respectively, with maximal mean reductions of 1.0 log<sub>10</sub> when applying alternative pluck set removal. The proportions of *Salmonella* and *Y. enterocolitica* positive throat samples were equal for both slaughtering methods and pathogens (1.7%). The presence of ESBL/AmpC-producing *E. coli* on throat samples diverged from 5% (normally slaughtered) to 14% (alternatively slaughtered). Similar results were seen for other carcass areas.

## Conclusion

The alternative pluck set removal method, requiring only minimal adaptations in the slaughterhouse, may contribute to improve the microbial quality of pig carcasses.

## Literature

1. De Busser, E.V., et al., Vet J, 2013. 196(1): p. 20-7.
2. Van Damme, I., et al. , Int J Food Microbiol, 2013. 164: p. 32-35.
3. Van Damme, I., et al., Food Microbiology, 2017. In Press. <http://dx.doi.org/10.1016/j.fm.2017.03.012>.